

CLAIMS

WHAT IS CLAIMED IS:

1. A method for coating optical elements, in particular those optical elements for optical systems using ultraviolet light, in a working chamber of a coating device, the method comprising:

providing at least one lock system with at least one evacuable lock chamber that may be separated from, or connected to, the working chamber;

positioning at least one optical element in the lock chamber;

treating the optical element inside the lock chamber;

equalizing the atmospheres of the working chamber and the lock chamber;

transporting the optical element between lock chamber and working chamber under exclusion of the environmental atmosphere.

2. A method according to claim 1, wherein the treating step comprises cleansing of the optical element in the lock chamber, the cleansing step comprising irradiation of the optical element with ultraviolet light.

3. A method according to claim 2, wherein an evacuation of the lock chamber is performed during the cleansing.

4. A method according to claim 2, wherein before and/or during the UV cleansing the atmosphere in the lock chamber is enriched with a processing gas, such as oxygen.
5. A method according to claim 1, wherein the treating step comprises pre-cleansing of at least one surface of an optical element that is to be coated before the coating takes place.
6. A method according to claim 1, wherein the step of coating optical elements includes depositing multiple coatings using at least two subsequent coating steps, wherein at least one treatment step performed inside the lock chamber is performed between two subsequent coating steps performed in the working chamber.
7. A method according to claim 1, wherein the treating step comprises post-cleansing of finished, coated optical elements in the lock chamber.
8. A method according to claim 1, wherein the treating step comprises measuring at least one optical property of the optical element inside the lock chamber.
9. A method according to claim 8, wherein the step of measuring includes at least one of measuring the transmittancy, the reflectivity and the absorption factor of the optical element.
10. A method according to claim 8, wherein the measuring step performed inside the lock chamber is performed in a lock chamber atmosphere different from the environmental atmosphere.

11. A method according to claim 10, wherein the measuring step performed inside the lock chamber is performed in a vacuum.

12. A method according to claim 1, wherein the treating step comprises controlling the temperature of the optical element in the lock chamber.

13. A method according to claim 12, wherein the step of controlling the temperature of the optical element includes at least one of changing the temperature of the optical element with a controlled rate of temperature change and maintaining the temperature of the optical element at a predetermined temperature.

14. A method according to claim 12, wherein the step of controlling the temperature of the optical element includes introducing a gas into the lock chamber for at least one of performing and supporting the step of controlling the temperature of the optical element by action of the gas introduced into the lock chamber.

15. A method according to claim 14, wherein the gas introduced into the lock chamber is a hot gas with a temperature above the temperature of the environment, whereby the temperature of the optical element is increased above the temperature of the environment at least partially by contacting the optical element with the hot gas.

16. A method according to claim 12, wherein the step of controlling the temperature of the optical element comprises radiating heat radiation onto the optical element.

17. A method according to claim 1, wherein a plurality of optical elements is coated in one process, the process being divided into several processing intervals, wherein during one processing interval at least one optical element is arranged inside a closed working chamber for coating and at least one other optical element is arranged in a lock chamber assigned to the working chamber, wherein treating of the optical element inside the lock chamber is performed during other processing interval.

18. A lock system adapted for being connected in vacuum tight manner to a coating device, the coating device being equipped with at least one working chamber for coating optical elements, the lock system comprising:

a casing containing at least one evacuable lock chamber, the lock chamber being equipped with at least one access opening that can be either opened for introducing optical elements into the lock chamber or removal of optical elements out of the lock chamber;

at least one lock device for opening or closing the access opening; and

at least one treatment device assigned to the lock chamber for treating optical elements arranged in the lock chamber.

19. A lock system according to claim 18, wherein at least one treatment device is a cleansing device for at least one of contact-free and dry cleansing of at least one surface of an optical element arranged in the lock chamber.

20. A lock system according to claim 19, wherein the cleansing device is provided with at least one ultraviolet light source.

21. A lock system according to claim 19, wherein at least one vacuum tight window is incorporated into a casing wall of the casing of the lock system, the window being made of a material permeable for ultraviolet light and wherein at least one ultraviolet light source is located outside the lock chamber in the area of the ultraviolet light-permeable window so that optical elements inside the lock chamber may be irradiated with light from the ultraviolet light source through the window.

22. A lock system according to claim 18, wherein at least one gas supply line is provided to lead into the lock chamber, the gas supply line being adapted to be connected to an external gas source.

23. A lock system according to claim 18, wherein at least one suction line is provided to lead into the lock chamber, the suction line being connectable or connected to a vacuum pump.

24. A lock system according to claim 18, wherein at least one treatment device assigned to the lock chamber is a measuring device for measuring at least one property of at least one optical element arranged inside the lock chamber.

25. A lock system according to claim 24, wherein the measuring system is designed to measure at least one optical property of an optical element arranged in the lock chamber.

26. A lock system according to claim 18, wherein at least one heating device for heating optical elements inside the lock chamber is assigned to the lock system.

27. A lock system according to claim 26, wherein the heating device comprises at least one radiation heating element for heating optical elements inside the lock chamber using heat radiation.

28. A lock system according to claim 18, wherein at least one of at least one device for introducing hot gas into the lock chamber and at least one device for introducing processing gas with a set temperature into the lock chamber is assigned to the lock system.

29. A lock system according to claim 18, wherein the working chamber of a coating device is free from systems for at least one of cleansing and heating the optical elements to be coated in the working chamber.

30. A coating system for coating optical elements, the coating system comprising a coating device equipped with at least one working chamber for coating optical elements inside the working chamber, wherein the coating device is assigned at least one lock system, the lock system comprising:

a casing containing at least one evacuable lock chamber, the lock chamber being equipped with at least one access opening that can be either opened for introducing optical elements into the lock chamber or removal of optical elements out of the lock chamber;

at least one lock device for opening or closing the access opening;

and at least one treatment device assigned to the lock chamber for treating optical elements arranged in the lock chamber.

31. A coating system according to claim 30, wherein at least two lock systems are assigned to the coating system.

32. A coating system according to claim 31, wherein one lock system is designed as a supply lock system for introducing optical elements out of the supply lock system into the working chamber and another lock system is designed as an exit lock system for removing optical elements out of the working chamber through the exit lock system.

33. A coating system according to claim 30, wherein the coating device and the lock system are adjusted to each other such that the lock system can be connected to and is removable from the coating device, creating a vacuum tight connection between the lock chamber and the working chamber.

34. A method for coating optical elements, in particular those optical elements for optical systems using ultraviolet light, in a working chamber of a coating device, the method comprising:

providing at least one lock system with at least one evacuable lock chamber that may be separated from, or connected to, the working chamber;

positioning at least one optical element in the lock chamber;

treating the optical element inside the lock chamber, wherein the treating step comprises measuring at least one optical property of the optical element inside the lock chamber;

equalizing the atmospheres of the working chamber and the lock chamber;

transporting the optical element between the lock chamber and the working chamber under exclusion of the environmental atmosphere.

35. A coating system for coating optical elements, the coating system comprising a coating device equipped with at least one working chamber for coating optical elements inside the working chamber, wherein the coating device is assigned at least one lock system, the lock system comprising:

a casing containing at least one evacuable lock chamber, the lock chamber being equipped with at least one access opening that can be either opened for introducing optical elements into the lock chamber or removal of optical elements out of the lock chamber;

at least one lock device for opening or closing the access opening;

and at least one treatment device assigned to the lock chamber for treating optical elements arranged in the lock chamber, the treatment device comprising at least one measuring device for measuring at least one optical property of the optical element inside the lock chamber.